1859MNRAS..19..171D

On the Silvering of Glass Specula. By Warren De La Rue, Esq. Ph. D. F.R.S., and Hugo Müller, Esq., Ph. D. F.C.S.

Our attention having been directed to the silvering of glass specula, we have made experiments with a variety of processes published and unpublished, but we have found that, on the whole, none ensure so good a result as that described by Baron Liebig in the *Annalen der Chemie und Pharmacie*, xcviii. p. 132. Among the processes submitted to trial and found to give good mirrors, we may mention the reduction of an alkaline solution of silver by means of tartaric acid, saccharic acid, glyceric acid, grape sugar, oil of cloves, and the aldehydes; but generally it is very difficult with these reducing agents to obtain the silver surface in a proper condition for polishing, although with due care this may be accomplished.

Liebig's published process is as follows:—10 grammes of fused nitrate of silver are dissolved in 200 cubic centimètres of water, and just enough liquid ammonia is added to this solution to redissolve the brown precipitate first formed. This solution is mixed with 450 cubic centimètres of a solution of caustic soda, specific gravity 1·035. A purplish black precipitate forms on the admixture of these solutions, which is to be dissolved again by the careful addition of ammonia. After which 800 cubic centimètres of water are added and so much of a dilute solution of nitrate of silver as to occasion a permanent slight precipitate of oxide of silver; 50 cubic centimètres of water finally are added, and the solution filtered. This is then the normal alkaline solution of silver which is retained for use when required.

Just previous to the silvering operation eight parts of this alkaline silver solution are mixed with one part of a solution of sugar of milk, containing one part of sugar of milk in ten parts by weight of water.

In order to prepare the surface to be silvered so as to insure the adhesion of the silver film, it is rubbed over with a solution of cyanide of potassium by means of a cotton wool; after the surface is thoroughly cleansed in this matter, it is washed with distilled water, and, just previous to its immersion in the silvering liquid, it is wetted with strong spirit of wine.

All things being ready, the silvering solution is poured into a vessel sufficiently deep to contain the speculum in a vertical direction; but instead of placing the mirror exactly vertical, it is allowed to lean slightly over to one side, the surface to be silvered being placed downwards.

In a few seconds the solution darkens, becomes brown, and deposits the silver on the glass in the first instance as a black or purple transparent mirror; this gradually brightens and becomes more and more metallic, and finally, in about three quarters of an hour, a film is obtained at ordinary temperatures which is extremely thin and regular in thickness; this mirror

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has a slight bronzy hue by reflected light, and if of the proper thickness, transmits a deep blue light when the sun is viewed through it. It readily, after drying, receives a polish when rubbed with a piece of chamois leather and dry rouge (peroxide of iron): it is much harder than ordinary silver, and bears the same relation to it as electro-precipitate, copper, iron, &c. bear to those metals prepared by the ordinary metallurgic methods.

Results of Observations of Small Planets, made with the Transit Circle at the Royal Observatory, Greenwich, during the months of January and February, 1859.

(*Communicated by the Astronomer Royal.*)

Astræa ⑤.

Mean Solar Time of Observation.		Apparent R.A.	Apparent N.P.D.
	h m s	h m s	° ′ ″
1859, Feb. 18	14 16 6·5	12 10 7·72	86 42 53·25
25	13 45 21·8	12 6 53·91	85 51 42·27

Hygeia ⑩.

Mean Solar Time of Observation.		Apparent R.A.	Apparent N.P.D.
	h m s	h m s	° ′ ″
1859, Jan. 22	9 52 20·1	5 59 10·98	65 49 1·40
Feb. 7	8 42 35·6	5 52 20·00	66 4 15·68

Victoria ⑫.

Mean Solar Time of Observation.		Apparent R.A.	Apparent N.P.D.
	h m s	h m s	° ′ ″
1859, Jan. 7	11 49 6·9	6 57 8·59	77 3 31·42
22	10 35 2·4	6 42 0·35	76 52 21·06

Jan. 22, Obs. of N.P.D.—The zenith distance pointer has been increased 1°.

Irene ⑭.

Mean Solar Time of Observation.		Apparent R.A.	Apparent N.P.D.
	h m s	h m s	° ′ ″
1859, Feb. 22	14 52 26·3	13 2 19·73	80 5 9·67
23	14 48 21·5	13 2 10·84	79 58 39·22
24	14 44 14·5	13 1 59·66	79 52 6·30
25	14 40 6·2	13 1 47·26	79 45 25·22

Thetis ⑰.

Mean Solar Time of Observation.		Apparent R.A.	Apparent N.P.D.
	h m s	h m s	° ′ ″
1859, Feb. 7	8 54 9·7	6 3 55·97	69 4 37·95

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